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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,785

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EXAMINER

ROBERTSON, DAVID

ART UNIT

PAPER NUMBER

2121

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,785	Applicant(s) ABDULLAHI ET AL.	
	Examiner Dave Robertson	Art Unit 2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/5/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This is a Non-final First Office Action on the Merits. Claims 4-21 as amended by preliminary amendment on 9/5/2006 are examined herein.

Information Disclosure Statement

2. The information disclosure statement (IDS) filed 9/5/2006 is in compliance with the provisions of 37 CFR 1.97. However, foreign references listed and submitted therewith have been considered by the examiner only to the extent of the English language material provided as indicated on the PTO 1449 accompanying this office action (see "Abstract Only" in the Examiner Initials area of the foreign references).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 4-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites: *A method for coating a workpiece, wherein...* followed by several "wherein" clauses describing acts on an object (e.g. *a material is applied...; the regulator is a neuro-fuzzy regulator combining...*), however, without positively stating any acts or steps in the claimed method other than modifications to unclaimed steps or steps. A process is a series of acts or steps, therefore it is unclear from the manner claimed what

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steps or acts comprise the method. For the purposes of examination, and as can best be determined from the manner claimed in light of the disclosure, each *wherein...* clause will be interpreted as a step or act performing a function on the object(s) of each limitation. Claims 5 and 6 depend from claim 4 and are similarly deficient.

Appropriate amendment or clarification is requested.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4-21 rejected under 35 U.S.C. 103(a) as being unpatentable over in view Duncan et al. (US Pat. No. 7,290,589) in view of Guessasma et al. ("Modeling of the APS plasma spray process using artificial neural networks: basis, requirements and an example," March 2004)

Claims 4-6

Duncan et al. teaches **a method for coating a workpiece** (see Abstract), **wherein a material is applied to the workpiece by thermal spray coating** (see Background directed to methods and apparatus of spraying "molten droplets), **wherein the actual values are compared directly with target values** (column 3, lines 47-56), **or wherein characteristic quantities derived from the actual values are compared with the target values, and wherein, when there is a deviation between the actual**

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values or the characteristic quantities and pre-specified target values (column 3, lines 57-67), **process parameters for the thermal spray coating are adjusted automatically by a regulator** (column 3, lines 47-67).

However, Duncan et al. does not expressly teach the regulator is **based on at least one neuronal network, wherein the regulator is a neuro-fuzzy regulator combining the at least one neuronal network and fuzzy logic rules and thus mapping statistical relationships between input variables and output variables of the neuro-fuzzy regulator, or wherein the thermal spray coating process is monitored on-line by detecting properties of particles in a spray jet.**

Guessasma et al. expressly teaches a method for controlling thermal spray coating processes using neural networks to create and map statistical relationships between input variables and output variables (see Abstract; Introduction), wherein the thermal spray coating process is monitored on-line by detecting properties of particles in a spray jet (see Results Section 5.2 *In-flight particle characteristics*). Guessasma is expressly directed to improving the processes of Duncan to improve the deposition yield of thermal spray coating control processes.

Applying a known technique to known device, method, or product that is ready for improvement is obvious if the particular known technique was recognized as part of the ordinary capabilities of one skilled in the art, who would have been capable of applying this known technique to the known device, method, or product, and the results would have been predictable to one of ordinary skill in the art. *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). MPEP ¶ 2141 [R-6].

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Duncan and Guessasma being directly in the art of the invention, and Guessasma expressly directed to the improvement of apparatus and processes such as Duncan, it would have been obvious to one of ordinary skill in the art at the time of the invention to improve the apparatus and methods of Duncan with the technique of Guessasma in order to improve the deposition yield of thermal spray coating control processes, with the predictable results (as taught by Guessasma, see Table 3 and related discussion) of improving the performance of the deposition process leading to higher yields in the resulting coating product.

Claim 5

Duncan et al. teaches or suggests **the method according to Claim** , including the criticality of temperature and size of particles, however, Duncan does not expressly teach **wherein the properties *detected* for the spray jet include particle temperature and/or particle velocity and/or particle size and/or a luminous intensity of the particles.**

Guessasma, however, expressly teaches monitoring (i.e. “detecting”) temperature, velocity, and size of particles (see page 324; Section 5.2 *In-flight particle characteristics*) using infrared pyrometric tools (pg. 320, Section 3.2). For the same reasons given above under claim 4 with respect to Duncan, a known device ready for improvement by the methods of Guessasma, it would have been obvious to one of ordinary skill in the art at the time of the invention to include *detection* of these particle characteristics, predictably resulting in improved deposition yields.

Claim 6

Duncan et al. teaches or suggests **the method according to Claim 4**, and in view of Guessasma as above the use of **a layered artificial neuronal network (ANN)** (Figure 3), however Guessasma does not expressly teach **wherein the neuronal network comprises at least four layers each having multiple neurons, wherein the neurons of an input layer map a fuzzification, the neurons of an output layer map a defuzzification, and the neurons of the layers arranged between the input layer and the output layer map a fuzzy inference.**

However, Guessasma is an illustration of an example artificial neural network, where neural networks are known in the art to contain more than three layers depending on design choices reflecting desired precision or speed of the network or training of the network. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide *four* layers in the ANN as this would have predictably resulting in more precision in tradeoff for training speed or in more or less of other characteristic or performance tradeoffs. Neural networks are further known to be closely associated with concepts of fuzzy logic, where approximations are provided by the operation of the neural network with data input layers providing “fuzzification” and data output layers providing “defuzzification” as an operation of the ANN.

Claims 7-16 recite methods substantially above as for claims 4-6 and is/are similarly rejected for reasons given above, for the respective claim and claim elements, and further that a **plasma spray process** is by definition in the art a thermal spray process (claim 9); an infrared pyrometer (as in Guessasma, above) measures

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luminous intensity of the particle (claim 13); and the passing of inputs to outputs in a neural network is a **mapping a relationship... processing... and converting... to an output variable** (claim 15); and **processing...** by an ANN is processing **by linguistic rules and fuzzy operators**.

Claims 17-21 recite apparatus for performing the methods of claims 4-16 as above, and are similarly rejected for reasons given above, for the respective claim and claim elements, and further that Duncan et al. and Guessasma each teaches apparatus for the performing, including **a camera** (Duncan Figure 1 (5) suggesting Guessama's "infrared pyrometric tools"), **and an image processing system** (see Duncan, column 7, performed with Figure 1 (5) and (6) the computer); and **wherein an actual value of a property of a particle in the spray jet is determined by the image processing system from an image of the spray jet obtained from the camera** (see Duncan et al. Figure 1 (5) Thermal Imaging Camera in view of Guessasma Figure 1, 6, and 7).

Conclusion

7. The prior art made of record and listed on the attached PTO Form 892 but not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dave Robertson whose telephone number is (571)272-8220. The examiner can normally be reached on 9 am to 5 pm, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dave Robertson/
Examiner, Art Unit 2121